

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. **(currently amended)** An apparatus to be connected between a network access unit and a network to be protected, for protecting legitimate traffic from DoS (denial of service) and DDoS (distributed denial of service) attacks, said apparatus comprising:

a high-priority queue;

a low-priority queue;

a queue information table having for each specific STT (source-based traffic trunk), a service queue for information of a specific packet having the specific STT, wherein the service queue is the high-priority queue or the low-priority queue;

a queue coordinator for updating the queue information table based on a load of a provided STT and a load of the high-priority queue;

a packet classifier for receiving a packet from the network access unit, searching the queue information table for a investigating an STT-service queue associated with an STT of the received packet ~~from the queue information table~~, selectively transferring the received packet to the high-priority queue or the low-priority queue in accordance with the service queue, an investigation result and providing information on the received packet to the queue coordinator;

a queue coordinator for receiving information on the received packet from the packet classifier, and updating the service queue associated with the STT of the received packet in the queue information table based on a load of the STT of the received packet; and

a buffer for buffering outputs of the high-priority queue and the low-priority queue and

providing the buffered outputs to the network to be protected.

2. (original) The apparatus of claim 1, wherein the network to be protected comprises a server.

3. (currently amended) The apparatus of claim 1, wherein the information on the received packet includes a packet size, a packet arrival time and an STT index ~~of the queue information table for~~ representing the STT information of the received packet.

4. (currently amended) The apparatus of claim 1, wherein the queue information table has fields including:

- an STT ID field,
- a service queue field,
- an average load field,
- a recent load calculation time field, and
- a total packet size field.

5. (currently amended) The apparatus of claim 1, wherein a maximum load of both the high-priority queue and the low-priority queue is set to be a maximum allowable load of the network to be protected.

6. (original) The apparatus of claim 5, wherein the network to be protected comprises a server.

7. (currently amended) A method ~~[[for]]~~ of protecting legitimate traffic from DoS (denial of service) and DDoS (distributed denial of service) attacks ~~in an apparatus therefor, wherein the~~ by way of an apparatus which is connected between a network access unit and a

network to be protected and which includes;

a queue information table having, for each specific STT(source-based traffic trunk), a service queue for information of a specific packet having the specific STT, wherein the service queue is a high-priority queue or a low-priority queue,

a queue coordinator, for updating the queue information table based on a load of a provided STT and a load of a high-priority queue and

~~a packet classifier, for receiving a packet from the network access unit, investigating an STT service queue of a received packet from the queue information table, selectively transferring the received packet to the high-priority queue or the low-priority queue in accordance with an investigation result and providing information on the received packet to the queue coordinator;~~

the method comprising the steps of:

(a) obtaining, by the packet classifier, an STT (STT<sub>R</sub>) of a packet received from the network access unit based ID based on a source IP address of the received packet ~~received from the network access unit;~~

(b) searching, by the packet classifier, the queue information table for the investigating a service queue corresponding to STT<sub>R</sub> ~~the searched STT ID from the queue information table~~ and checking, by the packet classifier, whether the service queue is the high-priority queue or the low-priority queue;

(c) transferring, by the packet classifier, the received packet to the high-priority queue if the service queue is the high-priority queue in the step (b);

(d) transferring, by the packet classifier, the received packet to the low-priority queue if the service queue is the low-priority queue in the step (b); ~~[[and]]~~

(e) transferring, by the packet classifier, packet information on the received packet ~~information~~ to the queue coordinator; and

(f) updating, by the queue coordinator and based on a load of STT<sub>R</sub>, the service queue associated with STT<sub>R</sub> in the queue information table.

8. (original) The method of claim 7, wherein the network to be protected comprises a server.

9. (currently amended) The method of claim 7, wherein the step (f) comprises the following steps performed by the queue coordinator ~~comprises the steps of:~~

(a') calculating an average load of STT<sub>R</sub> based on an STT ~~corresponding to the packet~~ information transferred from the packet classifier;

(b') selectively resetting the an-STT service queue associated with STT<sub>R</sub> depending ~~based on the calculated average load of the-STT STT<sub>R</sub>;~~

(c') calculating an average load of the high-priority queue;

(d') selectively resetting a certain-STT service queue associated with a certain STT ~~depending based on the calculated average load of the high-priority queue; and~~

(e') storing the selectively reset service queue STT information ~~in the queue information table.~~

10. (currently amended) The method of claim 9, wherein the step (e') further comprises:

storing modified STT information ~~refers to a modified average load and service queue in the~~ queue information table.

11. (currently amended) The method of claim 9, wherein the step (a') further includes the steps of:

(a'1) calculating a total packet size based on the packet information transferred from the packet classifier;

(a'2) checking whether it is time to recalculate ~~[[an]]~~ the average load;

(a'3) if it is time to recalculate the average load in the step (a'2), calculating a new average load by using (i) a previous average load and (ii) a current average load based on the total

packet size, and then proceeding to the step (b') if it is time to recalculate the average load in the step (a'2); and

(a'4) ~~performing an STT service queue determination algorithm based on the load of the STT if it is not time to recalculate the average load, proceeding to the step (b') or subsequent to executing the step (a'3).~~

12. **(currently amended)** The method of claim 11, wherein the packet information includes a packet size, a packet arrival time, and an STT a queue information table index ~~and a~~ corresponding to STT<sub>R</sub>.

13. **(currently amended)** The method of claim 9, wherein the step (b') further includes the steps of:

(b'1) setting ~~the an STT service queue associated with STT<sub>R</sub> of a received packet~~ to be [[a]] the low-priority queue if the calculated average load of STT<sub>R</sub> an STT load of the received packet is greater than an allowable load when the high-priority queue is in a congested state;

(b'2) randomly choosing one STT (STT<sub>S</sub>), which uses the ~~using a~~ low-priority queue, from the queue information table if the service queue associated with STT<sub>R</sub> is the of the STT corresponding to the received packet is a high-priority queue;

(b'3) following the step (b'2), setting ~~a an STT service queue associated with STT<sub>S</sub> of a low load~~ to be [[a]] the high-priority queue and the service queue associated with STT<sub>R</sub> an STT service queue of a high load to be [[a]] the low-priority queue if [[an]] the average load of STT<sub>R</sub> an STT corresponding to the received packet is greater than that of the randomly chosen STT<sub>S</sub>;

(b'4) randomly choosing one STT (STT<sub>S</sub>), which uses the ~~using a~~ high-priority queue, from the queue information table if the service queue associated with STT<sub>R</sub> of the STT corresponding to the received packet is a is the low-priority queue; and

(b'5) following the step (b'4), setting ~~an STT service queue of a low load~~ the service queue associated with STT<sub>R</sub> to be [[a]] the high-priority queue and a service queue associated with

~~STT<sub>S</sub> the STT service queue of a high load to be [[a]] the low-priority queue if [[an]] the average load of STT<sub>R</sub> an STT corresponding to the received packet is smaller than that of the randomly chosen STT<sub>S</sub>.~~

14. **(currently amended)** The method of claim 9, wherein the step (c') further includes the steps of:

(c'1) determining whether the an-STT service queue associated with STT<sub>R</sub> after the selective resetting in the step (b') is the high-priority queue or the low-priority queue based on a load of an STT;

(c'2) calculating a total packet size served through [[a]] the high-priority queue if the service queue associated with STT<sub>R</sub> is the used by the received packet is a high-priority queue;

(c'3) calculating [[an]] the average load of [[a]] the high-priority queue if it is time to recalculate a load the average load of the high-priority queue; and

(c'4) proceeding to the step (d'), resetting a certain STT service queue based on the load of the high-priority queue; and

(c'5) ~~storing modified STT information in the queue information table.~~

15. **(currently amended)** The method of claim 9, wherein the step (d') includes the steps of:

(d'1) obtaining the calculated calculating an average load of [[a]] the high-priority queue from the step (c');

(d'2) randomly choosing one STT, which uses the using a high-priority queue, and setting a service queue of the randomly chosen STT to the low-priority queue if the calculated average load of the high-priority queue indicates that the high-priority queue is in a congested state;

(d'3) randomly choosing one STT, which uses the using a low-priority queue, and setting a service queue of the randomly chosen STT to the high-priority queue if the calculated average load of the high-priority queue indicates that the high-priority queue is in an idle state; and

(d'4) ~~proceeding to the step (e') storing modified STT information in the queue information table if the calculated average load of the high-priority queue indicates that the high-priority queue is in a stable state or when one of the steps of (d'2) and (d'3) [[are]] is performed.~~

16. **(new)** The method of claim 7, wherein the step (f) comprises the following steps performed by the queue coordinator:

(a') calculating an average load of  $STT_R$  based on the packet information transferred from the packet classifier;

(b') selectively resetting the service queue associated with  $STT_R$  depending on the calculated average load of  $STT_R$ ; and

(c') storing the selectively reset service queue in the queue information table.

17. **(new)** The method of claim 16, wherein the step (b') further includes the steps of:

(b'1) setting the service queue associated with  $STT_R$  to be the low-priority queue if the calculated average load of  $STT_R$  is greater than an allowable load when the high-priority queue is in a congested state;

(b'2) randomly choosing one STT ( $STT_S$ ), which uses the low-priority queue, from the queue information table if the service queue associated with  $STT_R$  is the high-priority queue;

(b'3) following the step (b'2), setting a service queue associated with  $STT_S$  to be the high-priority queue and the service queue associated with  $STT_R$  to be the low-priority queue if the average load of  $STT_R$  is greater than that of  $STT_S$ ;

(b'4) randomly choosing one STT ( $STT_S$ ), which uses the high-priority queue, from the queue information table if the service queue associated with  $STT_R$  is the low-priority queue; and

(b'5) following the step (b'4), setting the service queue associated with  $STT_R$  to be the high-priority queue and a service queue associated with  $STT_S$  to be the low-priority queue if the average load of  $STT_R$  is smaller than that of  $STT_S$ .

18. **(new)** The method of claim 17, wherein the step (f) further comprises the following steps performed by the queue coordinator after the steps (a') and (b') and before the step (c'):

- (d') calculating an average load of the high-priority queue; and
- (e') selectively resetting a service queue associated with a certain STT depending on the calculated average load of the high-priority queue.

19. **(new)** The method of claim 18, wherein the step (e') includes the steps of:

- (e'1) obtaining the calculated average load of the high-priority queue from the step (d');
- (e'2) randomly choosing one STT, which uses the high-priority queue, and setting a service queue of the randomly chosen STT to the low-priority queue if the calculated average load of the high-priority queue indicates that the high-priority queue is in a congested state;
- (e'3) randomly choosing one STT, which uses the low-priority queue, and setting a service queue of the randomly chosen STT to the high-priority queue if the calculated average load of the high-priority queue indicates that the high-priority queue is in an idle state; and
- (e'4) proceeding to the step (c') if the calculated average load of the high-priority queue indicates that the high-priority queue is in a stable state or when one of the steps of (e'2) and (e'3) is performed.

20. **(new)** The method of claim 19, wherein the step (d') further includes the steps of:

- (d'1) determining whether the service queue associated with  $STT_R$  after the selective resetting in the step (b') is the high-priority queue or the low-priority queue;
- (d'2) calculating a total packet size served through the high-priority queue if the service queue associated with  $STT_R$  is the high-priority queue;
- (d'3) calculating the average load of the high-priority queue if it is time to recalculate the average load of the high-priority queue; and
- (d'4) proceeding to the step (e').